



# WILD Kids



7-12

Published by the Arizona Game & Fish Department - Education Branch and the Heritage Fund

Number 29

## Water and Wildlife

Drought conditions are normal in the arid southwest and indigenous species have developed physical and behavioral adaptations to these environments. For example, the kangaroo rat obtains all the water it needs from the food it eats. The specialized kidneys of the kangaroo rat, and other desert species, conserve precious body fluids

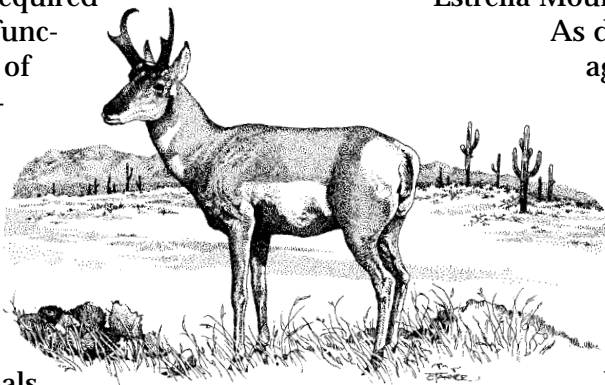
by concentrating the urine. Bighorn sheep have the ability to go long periods of time without water, and still avoid dehydration. Desert birds excrete concentrated waste in the form of uric acid, which is insoluble in water and excreted as a solid. In addition, most desert animals reduce water loss by limiting their daytime activities.

### The importance of water

Water is the most abundant compound in the bodies of birds and mammals. For example, water makes up 65% or more of the body weight of most mammals, humans included. Water is required for a number of physiological functions, including dissipation of heat, nutrient transport, digestion, excretion of waste products, and lactation.

Water needs of different species vary considerably. Fairly large animals, such as javelina and kit fox, and many species of small mammals, can get by without drinking water because they obtain it from other sources. How much water an animal needs depends on how efficiently an animal uses it. An important concept in understanding how animals use water is that of "water balance," which means the amount of water consumed must equal the water coming out. If the flow of water is negative, dehydration occurs. Animals in a negative water balance are not able to rid themselves of metabolic wastes or dissipate heat. A 20% loss in body weight due to water loss often means death.

During periods of extreme drought, even desert-adapted species may not be able to meet their water needs. Some animals simply do not survive. Others may fail to reproduce, due to poor health, or their offspring may not survive due to lack of food, water, and/or shelter.



### Working for wildlife

Prior to the creation of large housing developments, cities, freeways, and dams, wildlife could more easily move between water sources (e.g., from the Estrella Mountains to the Gila or Salt Rivers).

As desert areas were converted to agriculture and urban areas, wells were drilled, which in turn lowered the water table. These actions reduced the amount of water available to wildlife. Due to widespread concern over the alteration of habitat and its impact on wildlife, early resource managers began to look for methods to aid the recovery of wildlife populations.

In 1946, the Arizona Game and Fish Department built its first artificial water catchment. Water catchments are designed to "catch" rain water, store it, then divert it to a drinking trough (see WILD Kids 4-6 for a drawing of a water catchment). The first catchment efforts targeted specific species, such as Gambel's quail, although a wide variety of wildlife was observed drinking from these newly developed waters. Nearly all resource managers believed that water catchments were beneficial to wildlife, so water catchment development continued. Today, nearly 1,000 water catchments have been constructed throughout Arizona.

Once a catchment has been constructed, it must not only be maintained, but it must also provide a

reliable supply of water for wildlife. During extended dry periods, water is transported to some of the water catchments. The majority of water hauling is directed toward the arid regions (such as Yuma and Tucson). However, when precipitation amounts are below normal, water is also hauled to the south rim of the Grand Canyon and other areas of the state.

In an average year, about 400,000 gallons of water are hauled to water catchments. But, due to severe drought conditions, 1.6 million gallons of water have already been transported this year (January 2002 to September 2002). Water is hauled in 1,500 gallon water trucks or 400 gallon "water buffaloes" (a trailer hitched to a truck). Occasionally, water is delivered to remote areas via a helicopter using a 70 gallon "bambi bucket" (similar to that used by fire fighters).

Water hauling is not an easy task. Water trucks may break down in 120 degree heat, equipment can freeze in sub-zero temperatures, and trucks occasionally have to creep at two to three miles an hour over rough terrain to remote water holes.

Because construction of artificial water catchments is a relatively recent activity, resulting primarily from human development and habitat fragmentation, the effects of water catchments on wildlife have not been well documented. Studies have shown that bighorn sheep and mule deer populations have increased as a result of water catchment

development. Other studies show that desert bighorn sheep populations exist, and do quite well, in the absence of free-standing water.

Much of the criticism of water development falls into one of five categories: 1) artificial waters do not benefit wildlife populations; 2) they facilitate range expansion of predators or competitors; 3) they encourage expansion of exotic flora and fauna; 4) they may pose a threat to wildlife because of poor water quality and disease transmission; 5) they interfere with people's enjoyment of a natural-functioning ecosystem.

To address some of these concerns, Arizona Game and Fish Dept. biologists are currently studying the consequences of water development in southwestern Arizona. Video cameras have been set up at catchments to determine the type/number of species visiting catchments. Another part of the study involves evaluating water quality: pH, dissolved solids, salinity, and blue-green algae. Catchment waters are also being tested for the presence of water-borne pathogens that cause Trichomoniasis and Salmonellosis. Biologists are also studying the abundance of predators at catchments. (There is a belief that catchments are "predator traps," which provide predators enhanced opportunities to exploit prey.) Lastly, biologists are studying the expansion of non-native honeybees, as a result of water development, and the consequences for native bee pollinators, which are responsible for 70% of pollination for flowering plants.

- 
1. Various agencies and organizations hold different positions on the development of water catchments. Contact the following agencies/organizations to find out their positions on water catchment development: Arizona Zoological Society, Center for Biological Diversity, Friends of Cabeza Prieta, Sierra Club (Grand Canyon Chapter), The Wilderness Society, Arizona Game and Fish Dept., U. S. Forest Service, and Bureau of Land Management. Write a report on your findings.
  2. To learn more about desert wildlife and their adaptations to arid environments, research and write a report about one of the following animals: Couch's spadefoot toad, desert pupfish, desert kangaroo rat, kit fox, desert bighorn sheep, California leaf-nosed bat, or turkey vulture. In your report, include the range the animal occupies, how it obtains water, how it conserves water and its daily/seasonal activity periods.
  3. As of June 1999, Arizona has been in a declared state of drought emergency. Who is responsible for declaring a drought emergency? What are the determining factors? How does this affect people (farmers, ranchers, home owners) and community service providers (parks and recreation, golf courses, etc.), tourists, and field biologists.
  4. To find out more about water catchments and how, when, and why water is hauled, check out the September-October 2002 issue of the *Arizona Wildlife Views* magazine (there should be a copy in your school library).
-